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New methods and techniques for the communication of knowledge, by Herbert Coblans

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CONTENTS

New methods and techniques for the communication of knowledge, by Herbert Coblans. 153

New publications. 176

News and information. 178

Exchange of duplicate publications; Asiane seminar on exchange of publications in Japan; Unesco associated projects: Argentina; New Institute of Librarianship and Bibliography (Moscow); Special subject lists; An appeal by the Polish Academy of Science; Film on libraries; A French lending library for records; Scientific and Technical Documentation Division (Egypt).

Exchange. 181

National exchange centres. 183

Free distribution. 184

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(275) NEW METHODS AND TECHNIQUES FOR THE COMMUNICATION OF KNOWLEDGE

LONG-TERM PROGRAMME OF STUDIES

The following paper by Dr. Coblans is a first step in a long-term programme of studies, experiment and active promotion of developments in new methods and techniques for the communication of knowledge, which is becoming a principal interest of Unesco in co-operation with a number of library, documentation and scientific non-governmental organizations. Although advanced methods and techniques have been most developed in service to the exact sciences and technology, there are great potentialities for their use in the social sciences and, to a lesser extent, in the humanities. The Director-General therefore decided to ask Miss Barbara Kyle, who is at present engaged on a long-term and detailed study of social sciences documentation, to collaborate with Dr. Coblans in the preparation of this paper. In the course of doing so Miss Kyle prepared a detailed study which is being published in the *Review of documentation*.

These papers are intended to act as a stimulus to more extensive and more detailed studies among the librarians and documentalists most directly concerned with new methods and techniques, and also to increase awareness for the need of development among the people who use documentation and library services and who pay for them.

Unesco does not want them just to be published and left as it were between the covers of journals. They are intended to be working documents for careful study by experts in all subject fields and in all countries. Dr. Coblans' paper is in fact being published by Unesco copyright free, in the hope that it will be reproduced in whole or in part, and be placed on the agenda of the discussions of library and documentation associations and scientific bodies, and that, wherever possible, special study groups will be formed to discuss the whole of the paper or any parts which seem of special interest. All the bodies which are able to organize discussions of this sort are requested to notify the Head of the Libraries Division of Unesco and, when the discussions are held, to send him full reports. These should reach Unesco not later than the end of September so that they may be drawn together as a working paper for the next meeting of the International Advisory Committee on Bibliography which is to be held in Paris in December 1957. Pre-prints of both Dr. Coblans' and Miss Barbara Kyle's papers are available and, as far as the supply allows, can be sent in quantity to organizations interested.

The proposals made in the paper are the author's own. They have not yet been studied by any of the existing Unesco Advisory Committees or by the Director-General and hence do not express Unesco policy.

NEW METHODS AND TECHNIQUES FOR THE COMMUNICATION OF KNOWLEDGE

by HERBERT COBLANS, Head, Scientific Information Service, European Organization for Nuclear Research (CERN), Geneva

INTRODUCTORY NOTE

This working paper takes as its starting point the discussions and the conclusions of the Royal Society Scientific Information Conference (1948), the Unesco International Conference on Science Abstracting (1949) and the Unesco Conference on the Improvement of Bibliographical Services (1950). On these bases it attempts to relate the newer developments to documentation as a whole.

To keep within the given terms of reference it was necessary to omit detailed consideration of such traditional questions as subject headings, adequacy of abstracts, terminology, policy on central scientific libraries, etc. Certain related topics have been included where there seems to be a special urgency for immediate action and where mechanical methods offer a possible solution of old problems. While the methods are mainly described in their application to the literature of the natural sciences, it should be noted that they can be and have been applied in all branches of recorded knowledge.

I wish to thank the Director-General of the European Organization of Nuclear Research (CERN) for permission to undertake this work, and I gratefully acknowledge the courtesy shown and the information provided by Professor J. Wyart, the Director of the Service de Documentation of the Centre National de Recherche Scientifique in Paris and by Professor E. Pietsch, the Director of the Gmelin Institut für anorganische Chemie. This report also owes much to the useful suggestions and criticisms made by Unesco officials and numerous experts, though the author alone is responsible for the views expressed and the proposals made. Finally, it is a pleasure to record my appreciation of the co-operation and help given by Miss Barbara Kyle.

1. SCOPE AND TERMS OF REFERENCE

The use of new methods and techniques for the communication of knowledge will depend not only on the purpose of the control but also on the character of the various branches of knowledge. Although the needs of different disciplines vary widely, it is useful and convenient to adopt the broad distinction of cumulative and non-cumulative fields of knowledge [1].[1] In the former are included the natural sciences, technology and the social sciences, i.e. those subjects in which 'scientific method' is applied. It is in these areas that the implications and possibilities of new techniques will be examined.

On the other hand, in so far as humanistic studies and the fine arts are non-cumulative, there does not exist the same urgency to apply such methods of bibliographical control. The conventional practices of librarianship according to the minimum standards adopted by the Unesco Conference on the Improvement of Bibliographical Services [2], held in Paris in 1950, are reasonably adequate. Undoubtedly the use of machine methods at the lowest level of mechanical ordering will prove to be worth while for large-scale undertakings. The technical problems of using punched cards and related devices for listings and enumerative devices are well understood; it is mainly a question of administrative organization for maximum efficiency.

1. The figures in brackets refer to the bibliography on page 173.

However the use of machines for storing and selecting information, based on classification and coding, is of an entirely different order of complexity and is still much further from realization at levels of capital investment which are at present practical. The possibilities and limitations in the various 'sciences', as the term is used above, will be considered in this study and related to the methods of primary publication and final dissemination.

PART I. NEW TECHNIQUES

2. The principles on which the 'new and revolutionary' techniques popularized in a series of prophetic articles by Vannevar Bush are based, were already enunciated at the end of the last century. They are essentially Hollerith's use of punched cards in census work (mainly data processing) and—about the same time—Poulsen's patent for magnetic recording. During the last 20 years attempts have been made to adapt these devices as machines for use in documentation. Since the war a potentially more powerful tool, the electronic digital computer, has come into the field. In the evidence before the Bush Committee [3] on the application of machines to the U.S. Patent Office operations, it was stated that more than 50 companies are active in the U.S.A. in the production of some kind of data handling equipment. Actually by far the most important advance is an intellectual one—the gradual realization during the last decade that, without developments in the new science of information theory, cybernetics, the machines are of little value. In documentation terms this means that without great advances in our theories of classification and coding the recording and retrieval of information with machines becomes almost a self-stultifying process.

Three types of apparatus can distinguished at various stages of development and with certain interchangeable features: (a) Punched cards (edge-notched, overall or Cordonnier-Batten superimposable) selected either electromechanically or electronically. (b) Systems based on photographic methods (usually micro-forms) with photo-electric selection by code patterns; (c) Systems based on magnetic recording wire, drums or cores.

In spite of the fact that the use of these devices specifically for documentation and communication is so very recent, there is already a vast literature [4] on the subject. Although the art is yet too young for much in the way of valid generalization and critical evaluation to have been published, nevertheless the extent of use for a wide variety of tasks is certainly impressive.

2.1. EXAMPLES

A few striking examples of the successful use of mechanical selection ranging from simple manual sorting to high speed automatic retrieval leading to the desired information in printed form, will now be cited.

2.11. Perhaps the most typically successful use has been the correlation of property with chemical structure. More than 10 years ago a team of American chemists [5] had built up a battery of hand-sorted cards on which the properties of 8,000 insecticides were recorded. Thus by repeated sorting, for example all the insecticides soluble in a given liquid, solid at tropical temperatures and containing a phenolic group could be established.

2.12. The American magazine *Look* in 1949 was already controlling its collection of 85,000 pictures with Hollerith cards [6]. The detailed 'properties' of each picture—date, matt number, photographer, copyright status, multiple subject angles—are coded on a card into which a microfilm of the picture is bonded. When searching for suitable pictures the selection is made mechanically in the punched card file according to the desired criteria. What is thrown

up in selection can be viewed by placing the punched card in a special microfilm reader. Thus in most cases the original picture need never be examined, as the matt number suffices as instruction for the printing department.

2.13. The use of punched card machinery for semantic analysis and producing literary concordances and printing them directly by offset from the copy provided by the machine, is no longer a novelty. The first example of such a word index was published in 1951 [7]. Estimates for the cost of a concordance to the *Summa theologica* of St. Thomas Aquinas were discussed at the last meeting of the Deutsche Gesellschaft für Dokumentation.

2.14. A final example can be given at the very limit of development in this field—mechanical translation. The problem is one of the automatic selection, the storing and matching (the human analogues are memory and association) of units of information. The recent claim that the converted electronic mathematical computer (IBM 701) 'translates Russian sentences at the rate of one full sentence every six or seven seconds' is no longer in the realms of science fiction. The more modest view of W. N. Locke, one of the pioneers of mechanical translation, expressed a year ago is given as follows [8]: 'In answer to the question "When shall we see a machine translate?" my best guess is within five years. By that time there should be in operation one or more models turning out a good deal better than a word-by-word translation.'

2.2. GENERAL EVALUATION

It is clear that the potentialities of machines as substitutes for certain activities formerly held to be essentially human are great, and that the rate of achievement in the post-war years is remarkable. Nonetheless, the optimism of 1950 is giving way to doubt and critical reserve as to the basic efficiency of automation for certain types of documentation. At all events, quite apart from costing aspects there is still far too little knowledge of principles and a lack of experience at the pilot process stage.

After the enthusiastic reception given to the Rapid Selector when first publicly demonstrated in 1949, there came the more sober evaluations by R. R. Shaw [9] in 1951 and the scepticism of D. J. Urquhart [10] and B. C. Vickery [11] and others. Thus it has been 'calculated that in order to handle the daily reference load of the Library of Congress, 8,333 Univacs would be needed at an investment of close to a billion dollars' [12]. (The Univac is an electronic computing machine, designed by a subsidiary of the Remington-Rand Co., and considered to be suitable for the selection of bibliographical material.)

A few months ago M. Taube re-stated the problems in a significant paper [12]. Two quotations will suffice to show the trend of thought: 'Although the author has searched the literature assiduously and has asked assistance of several expert bibliographers . . ., he has not succeeded in finding one reference to a controlled experiment which demonstrates the superiority of commercially available equipment as compared to traditional manual systems.' And part of the explanation of this lies in the fact that 'Studies of the logic of information storage and retrieval have demonstrated that it is not data processing or rapid addition, subtraction, and multiplication that is required for storage and retrieval systems, but random access, instantaneous recognition and direct display of any item permanently stored in a static memory.'

While the above remarks are directed mainly against the value for documentation of present types of electronic computers, the potential levels of usefulness of the humbler punched card, in spite of its widespread adoption, needs much more study. Fairly typical cases of the scrapping of punched card files are the following: (a) In 1947 the Library of the Atomic Energy

Research Establishment at Harwell set up a punched card index for the subject control of its report literature. It was discontinued after a trial of two years in favour of an orthodox card index [13]. (b) I. A. Wahrheit [14], the former Librarian of the Oak Ridge laboratories of the U.S. Atomic Energy Commission, mentions the case of the Dow Chemical Co., which started a file on silicones. 'The fantastic number of new applications that were discovered for silicones made the card file grow at a prodigious rate so that in a very short time it took practically all day to sort the cards to find a single bit of information. As a result the entire file was discarded.'

Such examples do not justify any useful generalizations about punched cards; they demonstrate that the most suitable devices for indexing must be planned and applied in relation to the totality of the documentation process. Basic and controlled studies, such as those of A. T. Maierson and W. W. Howell [15] and R. G. Thorne [16], must be carried out for specific subject fields, for wide areas of related subjects and for different national traditions of library service. Maierson and Howell established that by coding the whole of the literature of metallurgy on to IBM cards an information service could be provided at a charge of about $5 per inquiry. Thorne has obtained quantitative expressions for the efficiency of subject catalogues and the cost of information searches in three special libraries using different indexing systems.

The result of a long period of study and research by J. W. Perry and his team in documentation with punched cards has recently been published under the title *Machine literature searching* [17]. It outlines a 'machine language' which has been developed for the encoding of abstracts and is suitable for retrieval. It represents a very positive approach to the potentialities of these new techniques and is an expression of the most optimistic school of thought in this field. Reviews on both sides of the Atlantic, while stressing its importance, have voiced certain doubts; E. de Grolier [18] on classification aspects and R. R. Shaw [19] on its basic assumptions. Shaw argues that 'As a matter of fact there are no machines in production that will do even a fraction of what is claimed (in the book). The machine on which most of the author's work was based was an experimental model of the IBM machine developed by Mr. Luhn, on which development work was discontinued more than a year ago. The only others that might be considered as remotely approaching these claims are Eastman's Minicard,[1] of which the first experimental model has not yet been completed, and the Rapid Selector, of which only a prototype has been built.'

It is to be hoped that in the coming years Perry and his team at the Center for Documentation and Communication Research of Western Reserve University can apply their methods to full scale operation in very broad subject fields.[2]

Proposal A. Costing studies for definite subject fields on an operational basis should be stimulated in the major countries in which machines are available. Unesco should take the initiative in planning such co-ordinated studies and providing some of the financial help through the International Council of Scientific Unions (ICSU) for specific subjects, the International Social Sciences Council, national organizations and foundations. Special consideration should be given to large national centres where such mechanization is being used.

1. However, it should be pointed out that the 'Eastman Minicard' uses a principle similar to that developed by J. Samain in his Filmorex equipment, which has been in use for some years now in France (see 2.32 below).
2. After the original transmission of this report to Unesco the February issue of the Center's *Newsletter* reached me. In it there is a brief description of the newly developed WRU Searching Selector, which was publicly demonstrated at the end of 1956. This machine would seem to bear out the claim questioned by Shaw in the above quotation.

2.3. CASE STUDIES

Most of the literature on the techniques of automatic documentation deals with applications of these methods for personal or institutional files, and for unpublished rather than published purposes. Within the terms of reference of this study it is their use for continuing and published control that is the main concern. It is for this purpose that national co-ordination and international collaboration is so essential, if we are to pull out of the present impasse in documentation.

Since there is little experience or much in the way of detailed published accounts of these new methods *in action*, I have tried to make a study of services not yet fully established but already beyond the initial stages. I have chosen three such cases; two in Europe, which I was able to visit in person, and a third more advanced example in the U.S.A. for which I have had to rely on published accounts.

2.31. Gmelin-Institut für anorganische Chemie (Clausthal-Zellerfeld). For a number of reasons this Institute presents an almost ideal test case. From 1817 when Leopold Gmelin produced the first edition of the classical *Handbuch der anorganischen Chemie* until 1921 there have been seven editions. The eighth edition of more than a 100 volumes covers the literature till 1949 and is planned to be completed by 1965. The ninth edition which will take up the literature from 1950 exists at the moment in the form of conventional index cards, from which the Institute provides an information service for its clients.

Its special interest from our point of view is, firstly that it covers a well defined but not narrow subject, which makes coding much simpler; secondly, it has an existing international body of clients, which uses the handbook and subscribes to a literature service. The traditional method of production of the Gmelin handbook is to assemble all the relevant papers in physical and inorganic chemistry. Abstracts from the abstracting periodicals are cut and pasted on standard cards. Additional cards are made by dye-line copying, one for each subject heading (according to their standard list) assigned to the paper. These constitute the Gmelin Archive File. When a new edition of a section of the handbook (it is arranged by chemical elements) is prepared for printing, the editors concerned are given all the relevant abstract cards and as many of the original papers as possible for their work of compilation.

Subscribers to the service receive at regular intervals either dye-line copies of the cards in the desired subject breakdowns or a batch of cards resulting from a search for a requested subject throughout the Archive File. It has recently been decided to mechanize this documentation by also encoding the abstracts on to IBM cards. A start will be made with alloys and in the course of this year it is hoped that clients can obtain complete documentation on all alloy literature since 1950 in the following forms: (a) abstracts on cards of all relevant information, and/or (b) the corresponding punched cards. In simple outline the method of procedure at the Institute will be to search the punched card file by desired subject heading or other feature. The cards found will indicate the serial number of the transparent master containing the abstract, which can then be copied heliographically. Similarly an automatic copy punch is made of the key punched card. Such a service provides a real flexibility for the user. He can maintain his documentation by hand filing, or by machine collation if machines are available; he can have additional copies of either type of card at a nominal charge and so build up special sets of cards by subject grouping.

The decision to introduce punched cards is a very serious one for the Gmelin Institute as it entails a great capital outlay and a vast programme of

encoding. It seems to have resulted from a conviction, right or wrong, that automatic selection is the only method for them to control the whole of chemistry (excluding organic) and so to maintain the established standard of the Gmelin handbook. The interim service to subscribers, between the appearance of new editions, is in a sense a by-product which they hope will help to pay for the regular publication of the new editions.

2.32. Centre National de la Recherche Scientifique (CNRS), Paris. The Centre de Documentation of the CNRS, which is designed to serve all French science, including also the social sciences, has an inherently more difficult task. Its abstracts periodical *Bulletin signalétique* must include all subjects, but clearly at a less intense level than the one-subject Gmelin. This Centre and the Institute of Scientific Information of the U.S.S.R. Academy of Sciences are the only two large national services which produce abstracting periodicals covering a wide range of subjects and are based on the complete analysis of a common stock of periodicals.

In one respect the CNRS bulletin has only limited value as an abstracting periodical—it provides no annual or cumulative subject indexes. In consequence it is almost unusable for retrospective searching. To fill this gap J. Samain has been experimenting since 1954 at the CNRS with the Filmorex system [20]. This system, which has been developed and patented by him, aims at combining the advantages of microfilm and punched cards—as the Rapid Selector does to a certain extent. The selection is also by photo-cell and based on a pattern of dots, but instead of continuous microfilm, single micro-sheets (45×72 mm) are used. The speed of selection is 600 micro-sheets per minute, approximately that of the punched card sorter. There is no automatic copying of the selected documents. Instead the micro-sheets are read in an ordinary microfilm reader. Consequently the apparatus, that is the camera and the selector, is much cheaper than the Rapid Selector can be, and falls within the range of equipment which can be purchased by a medium-sized documentation centre. Each micro-sheet has two parts, a two-page text on the one half and on the other 20 rows of patterns of spots, which permit the document to be given 20 different code numbers to represent its characteristics, such as author, language, accession number, subject headings, etc.[1]

For the purposes of the CNRS each entry in the *Bulletin signalétique* could be transferred to a micro-sheet with coding of all its subject aspects, author, periodical etc. and the reference number of the abstract in the bulletin. In this way a list of all reference numbers of abstracts in the bulletin on a requested subject for a specified period of time could be supplied as part of its service to subscribers or at a nominal charge. If the cost of encoding all the abstracts since say 1946 and currently each year thereafter can be brought down to a reasonable level, such a method might well be cheaper and more effective than the ever increasing burden of printing annual and cumulative indexes to abstracting periodicals (which the CNRS has not been able to afford to print). After seeing it in operation I have no serious doubt that Filmorex can do the mechanical job of recording and selecting. The major problem as in all automatic documentation is that of classification, the elaboration of a system viable over the whole gamut of knowledge and enabling selection of all abstracts relating to a defined subject. So far Samain has worked out a somewhat arbitrary coding system based on five digits for chemistry and biology with more special emphasis on biochemistry.

At a much less complicated level of documentation the Centre has been using the Cordonnier variant of superimposable punched cards since 1953

1. The Kodak Minicard system [25] is similar in principle. The strips of film are 16×32 mm with very high reductions and therefore very compact in storage. Sorting speeds are very high. The Minicard is not yet available on the market.

for the control of its index of unpublished translations into French (Inventaire Général des Traductions). Entry is by author, periodical of original article and subjects. The cards provide a basis for immediate answers even by telephone and the publication of a monthly catalogue of translations. The number of items to be recorded on an average each year seems to be suitable for the limited capacity of a Cordonnier card with 12,500 positions for entry.

2.33. Chemical-Biological Coordination Center (CBCC) Washington [21, 22]. The purpose of the Center is to collect data and answer questions on the effects of particular chemical compounds on all types of living systems. This is done by obtaining data from a selected group of sources and controlling the information by punched cards. Up to 1955 there have been accumulated 150,000 observations of the effects of 63,000 chemicals with the help of about 1 ½ million punched cards. This is probably the largest system, using standard IBM equipment, that has been operating successfully for years for documentation purposes.

However its achievement and its significance for our inquiry must be assessed in the light of the fact that its 'subject' is a minute segment, highly specialized and precisely defined, of the overlap between the two great disciplines of chemistry and biology. There is no working example on a really large scale of punched card control covering the main fields of science and technology. The CBCC coding system would certainly be quite inadequate for such a purpose. There are two further interesting points. In contrast to other abstracting services, CBCC does not issue bibliographical publications. Its public service is to attempt to answer specific questions in its field. There is no simple basis for costing as it is a federal supported unit, within the National Research Council, and provides data free to scientists on request.[1]

2.4. DEDUCTIONS

The above three case studies provide no basis for firm conclusions, but they do indicate the difficulties and also certain committed lines of approach at pilot project stage. In what follows I shall attempt to summarize some published views on the theory and practice of automatic documentation. The two faces of this question, the obverse and reverse as it were, are coding and machines. Ten years ago it was held, rather naïvely as we see now, that what was needed was an all-purpose machine with fast input, output and great storage capacity. The Rapid Selector was hailed as the answer. It is realized now, and that is a great advance, that machines can be built by electronic engineers to almost any specifications—at a price of course. To make them efficient tools for information retrieval there must exist an adequate theory of information, i.e. in this context classification and coding.

2.41. Coding. Translate this modern jargon into traditional language and you have the axiom of librarianship that an adequate catalogue must provide an approach by subject as well as by author. This is done either by hierarchical classification or by alphabetical subject headings. The inadequacies of subject headings, especially for non-book material, have long been understood. This inadequacy was carefully studied in the Science and Technology Project established towards the end of the war in the Library of Congress. There each year hundreds of thousands of research reports, each devoted to a highly specialized branch of a narrow subject, had to be catalogued and referred

1. Since the completion of this study it has been reported in *Science* (vol. 125, p. 340, 22 February 1957) that, 'The National Academy of Sciences—National Research Council announces with regret that the CBCC, now in its eleventh year of operation, is to be discontinued. Although there has been widespread agreement among scientists familiar with its activities that the Center has great potential value to science, financial backing adequate to continue the Center at an effective level of operation has not been found'.

to retrospectively. One result was the system of co-ordinate indexing developed by M. Taube and his associates [23], after he left the project.

Both of the above approaches in subject control can of course be used in coding for all types of machines, but in their direct use many of the advantages of machine selection are lost—the machine is used inefficiently. Thus from the earliest use of punched cards a multitude of individual codes have been developed, often by users, without any acquaintance with the large existing literature on the theory of classification and subject headings.

From about 1950 interim results of a number of important theoretical studies [24] of indexing and coding for automatic documentation have been appearing. In the U.S.A. they include work done in the Patent Office, the National Bureau of Standards, the Welch Medical Library at Johns Hopkins University and by Mooers (zatocoding), Taube and associates and the Perry team [21]. It is not easy to summarize progress in a field that is growing so rapidly. A common principle is the use of non-hierarchical somewhat arbitrary terms or 'descriptors'. Samain calls them 'coordonnées', Taube 'uniterms'. In contrast the Perry team has developed a 'machine language', in which the basic concepts are analysed into their 'semantic factors and analytical relations'. Each subject heading is expressed and coded as a combination of the necessary number of these factors [17]. The full code book is announced for publication this year.

Finally there is the Classification Research Group [26] formed in London as a result of the Royal Society Scientific Information Conference [27]. Their work emphasizes the need for a faceted classification (in the Ranganathan sense) as the basis of all coding for information retrieval. The group is carrying out a practical examination of a series of subject fields.

All the above considerations refer to science and technology, where there is a fair degree of standardization and definition of the terms used, although it varies from subject to subject. This is clearly an essential pre-requisite, even in one language, and all the more so in any attempt at international co-ordination. Barbara Kyle has stressed that in the social sciences there is very little precision or standardization of terminology and so 'conceptual scatter' is a fundamental drawback to mechanization. 'Before solving the problem of rapid retrieval of two or more documents on the same subject, we have to solve a more difficult one, namely how to be sure which two documents are about the same thing, and then how to get people to call that thing by the same symbol'. The implication is that 'systems of classification and information retrieval which depend on precise unambiguous terms can only be used on a very small part of social science literature at present, namely that part which is truly scientific'. 'Accuracy in documentation must follow accuracy by subject specialists in their use of terms, *not* vice versa. As an interim measure the rival social science terminologies should be reduced to basic concepts for the purpose of arranging bibliographies, etc.'

To summarize, it can be said that the crucial importance of classificaion is now generally realized, that some research is under way, but it should be realized that there are no quick and easy solutions. Probably results of value will become available as a by-product of the intensive research now being undertaken in mechanical translation.

2.42. Machines. In the course of this year the second part of the FID *Manual on document reproduction and selection* [28] will be appearing and that provides the descriptive facts about most of the existing machines and systems. However, there does not exist a comparable critical analysis and comparison of their value for different purposes.

Proposal B. Unesco should commission a critical study of the potentialities of the apparatus described in the FID Manual, indicating their value and limitations for the main

uses in libraries and documentation work. It may be necessary to have a series of studies representative of the main trends of present controversy, including both the users and makers of machines.

An authoritative summary of American opinion in a special field as it was in 1954 is provided by the 'Bush report' [3] on the proposed use of machines in the U.S. Patent Office. It analyses the characteristics of the main systems as follows: (a) Punched cards. Suitable for low cost systems where speed is not essential, that is for collections of about 100,000 documents. (b) Photo-selection. 'Favorable for large collections of permanent material where the information stored changes slowly or not at all, but where rapid access to both specific records and large groups of records is necessary.' It combines compact storage with the advantage of easy provision of copies to users on request. (c) Magnetic recording. Compact, great storage capacity and high speed of reading. Adaptable to frequent revision and addition of information and easily coupled with the other two types and other communication systems. It is at a disadvantage where a few documents are to be selected and there are many selection criteria.

On comparative values Wahrheit [14] has made a useful observation. Strong advocates of punched cards are usually those who work in small specialized subject fields. Further, their enthusiasm varies inversely with the size of their card file; it is high at 5,000 cards and gradually disappears at about twice that number. As we have seen in the case of the Dow Co. it is the time for searching the whole file that is the inhibiting factor. This can be partly overcome.

Both at the Gmelin Institute and the CNRS multiple copies of the card or micro-sheet for each document are made—one for each of the main subjects. This makes a pre-selection possible and searching need only be carried out on small segments of the whole file.

For international collaboration punched cards have a useful advantage over the Filmorex system in one respect. Thus for example the punched cards supplied by the Gmelin Institute could be coded on the basis of the telegraphic style abstracts advocated by Perry [17]; then they could be regularly sent to the national chemical centres, where tabulators or typing units are available. This normal IBM equipment transfers the code back and prints the text in plain language. Perry has pointed out that the decoding could be done into any desired language. Thus a centre in São Paulo or in Sydney could give its users a Portuguese or an English version of the information on the card they have received from the German institute.

In spite of much published material on automatic documentation and intense activity in many countries, it is still too early to see the problem as a whole. There is no justification for any dogmatic assertions.

Two opinions expressed at the 1955 Conference of the Chicago Graduate Library School on 'The future of the book' should be a salutary warning of the dangers of prediction in this field. V. W. Clapp said: 'There will come a time—earlier or later in proportion to the effectiveness and economy of the needed technical developments—when it will be cheaper to get a book from a thousand miles away, by telefacsimile perhaps, than to go and fetch it from an inaccessible stackroom' [29]. R. R. Shaw said: 'Another electronic communication system about which a great deal has been written is the flat-bed facsimile transmitter built for the Atomic Energy Commission and which has been run for some months as a link between the Library of Congress and the National Institute of Health. Using any band width that can reasonably be applied to this purpose, the optimum rate of transmission of the system, at a level of quality equivalent to fair ditto copies, is about half a page a minute. Thus the average periodical article would require 20 minutes for its transmission at the speed of light and the machine could theoretically do about 24 articles

a day. (A single 300-page book would, however, require 10 hours of transmission time.) Either of these jobs could be done in an hour or two at much lower cost, either through inter-library loan or by using photostats and messenger service' [30].

When two leading American experts, who are probably in a better position to judge than most other documentalists, arrive at such diametrically opposite views, there is one obvious conclusion—the subject is not yet ripe for anything but opinion. It is still at the stage of what one might call 'documentation fiction'.

Thus in my view Taube's challenge mentioned above (page 156) stands, if it is understood that he means a machine system which can record and select over the whole range of knowledge. There is no doubt that reasonably efficient systems exist, or are about to be achieved, which can do this for a narrow highly specialized field where terminology is precise, concepts well defined and the number of documents not too large. The special problems of a patent office seem to belong to this category. The 'Bush report' [3] recommends quite definitely that 'The Patent Office should put machine searching of compositions on an operational basis'.

2.5. POSSIBILITIES

Even if not immediately economic or feasible, some form of automation is in the long run one of the most likely remedies for the documentation chaos already engulfing us. Let us accept that, for some time still, machines will not be able to compete with the associative human faculties, the tracking down by a mind versed in a subject. Therefore let us concentrate on what existing machines can do at the lower levels of documentation, at the clerical levels, where there is still so much to be done in advanced as well as underdeveloped countries. This need not preclude the co-ordination of what has already been achieved at higher levels.

Much of the inefficiency and frustration of documentation arises from the simple fact of the quantitative growth of published material which has to be brought under bibliographical control. The basis for any sort of selection at higher levels must be provided in the form of indexes to periodicals, both annual and cumulative, union catalogues, lists of translations, etc. In the day-to-day working of any special library, countless examples present themselves of the complete absence or very tardy appearance of these 'housekeeping' tools. They all involve arrangement of references in some simple logical or conventional order—a domain for which punched cards are ideally suitable.

I shall now mention some recent achievements and useful applications that could be introduced immediately.

2.51. Standard lists. Since 1947 the *Index to classification of patents* of the U.S. Patent Office has been 'printed' from punched cards. The already mentioned Science and Technology Project, in coping with the thousands of reports pouring in for cataloguing, had to issue an up-to-date 'List of subject headings' at very frequent intervals. The first list (1948) contained about 5,000 headings and it could only be maintained efficiently by the use of punched cards and photo-offset printing. A detailed account by E. Garfield [31] of this technique of the preparation of subject heading lists has recently appeared.

2.52. Union catalogues. After the last complete edition of 'Gregory' appeared in 1943 it became increasingly clear that it would be impossible to maintain a union catalogue of periodicals in conventional printed form in a country with as many large libraries as the U.S.A. Therefore in 1953 the Library of Congress started publishing *New serial titles* which records the holdings of co-operating

libraries in monthly issues and an annual cumulation. (It only includes new serials from 1950.) As acquired, the libraries report their new serials to the Library of Congress, where the information is coded in detail on to IBM cards. The monthly issues are photo-offset from the master copy made on the tabulator after sorting the cards. As the file of punched cards is built up, annual and other cumulations can be published automatically. Special lists can also be issued by subject, country of publication, language, etc. as sorting can be directed to any one of these characteristics.

As described by C. S. Scarafoni [32] the Union catalogue of Italian libraries is being prepared with the use of Remington-Rand punched cards.

2.53. Indexes to individual periodicals. Perhaps the most significant example of this use is in the *Current list of medical literature*. In 1951 this list partly replaced the *Index catalogue*, that great bibliographical tool of medicine, which had to be discontinued by the U.S. Army Medical Library, as such an index could no longer be produced adequately by conventional methods of compilation and printing. The Current List indexed over 1,500 different periodicals during the year 1956. Each monthly issue in that year was an index to about 9,000 items on the average. Current issues are only about two months behind the receipt of the periodicals. Every six months there is a semi-annual cumulation of the author and subject indexes. All the complications of author, subject, see and see also references, related authority lists, periodical title are controlled by punched cards which, through a printing unit, provide the master copy for offset printing [33].

2.54. International list of translations of periodical articles. This is in some ways the most immediate of all priorities for the documentation of the natural sciences. The rapid announcement of completed translations is the essential point. National lists exist, but they are slow and incomplete. A published index to all translations recorded anywhere appearing at least once a month is a minimum requirement. Punched card compilation would be quick and efficient. The need is so urgent that Unesco should either undertake such an index itself (as in the case of *Index translationum*) or subsidize its production on an international basis (see section 3.7, page 171).

Proposal C. International published lists of translations of periodical articles should be started, using the best available mechanical techniques to ensure a prompt and flexible service.

2.6. SUMMARY AND CONCLUSIONS

We all want the advantages provided by some form of automatic documentation—the bibliographical tools that we lack in so many fields. It is in everyone's interest, but in practice it is no one's immediate concern. Periodicals sell themselves either by their current interest or as the organs of learned societies or professional organizations. However there is no money in indexes, only an added expense. Therefore we must consider what is urgent and what sort of action can be undertaken, if necessary, through international help.

2.61. 'Low level'. Although this may be a somewhat pedestrian use of automatic methods, the lack of prompt annual and regular cumulative indexes, lists, etc., obviously calls for action. A rough check of lists of current periodicals (733 British, 427 French) showed that in both cases more than one sixth of the periodicals do not have annual indexes at all [34]. In most cases they are only author indexes and far too often appear after a delay of two or more years. Even if there are annual indexes there is hardly ever provision for a quinquennial cumulation. The outstanding example of how a good subject

index completely transforms the documentation level of a whole subject is that of the Decennial Index of *Chemical abstracts*. (At the present rate of growth of chemical literature it will probably soon become impossible to publish this in printed form.) In contrast much of the great effort and expense invested in such services as the *Bulletin signalétique*, the *Boletín* of the Mexican Centro de Documentación Científica y Técnica, the *Insdoc list of current scientific literature* are wasted, as without subject indexes they have no value for retrospective searching.

Everyone is agreed that we must have more and better printed indexes in the natural and social sciences and for national bibliographies, etc. But how is the extra financial burden to be met? Since in the short run bibliographical tools of this kind can never pay for themselves they must be subsidized nationally, internationally or by the various foundations. Unesco, in co-operation with the international federations of learned and technical societies, should investigate the following possibilities:

Proposal D. In each country or suitable region there should be at least one punched card unit combined with photo-offset equipment for the production of the various types of lists and indexes. Partly supported by subsidies these units, usually in association with national documentation centres, could provide the mechanical services at sub-economic rates.

Proposal E. A manual of the practice and organization of such services should be compiled so that existing uses can be made widely known. This manual could also include methods of utilization of punched card techniques in the preparation of national bibliographies and union catalogues.

Proposal F. Research should be subsidized and manufacturers stimulated to produce equipment more suited (e.g. type faces, lower case as well as upper) for the production of such 'clerical' lists, and to extend their use to other low level bibliographical tasks.

2.62. 'High level'. Moving from the comparative certainty of clerical uses of machines to the 'revolutionary' methods raises a number of critical questions. Accepting the more sceptical views that machines, be they electronic, photo-electric or magnetic, are a strong hope rather than a certainty just around the corner, what should be the immediate strategy? To what extent should Unesco commit itself to sponsoring research and development in machine methods as such?

It is my view that it is too early to move into the field decisively and that the whole subject must still be churned over in the hurly-burly of university research departments and in industrial laboratories. Nonetheless, there are a number of traditional Unesco working methods which should be used.

Since most work tends to be national and bound by local traditions there is the primary duty to assess progress and publish syntheses from an international viewpoint. The typical example is the Unesco contract with the FID for the *Manual on document reproduction and selection* [28]. This useful compilation provides the facts about instruments and methods indicating national suppliers, prices, etc. It is kept up-to-date by loose-leaf supplements. This must be followed by a manual of evaluative studies and critical analysis of the suitability of what exists for the documentation processes that are needed. (See Proposal B, p. 161).

In the special fields where the problems are clearly defined and the solutions tested Unesco could take immediate action. A typical example is classification and mechanization in the control of patents, where enough research and development have already been done.

Proposal G. Unesco should organize an international conference of experts from all patent offices to discuss mechanization, and publish in its proceedings an authoritative summary of the state of present knowledge in this field.

Above all there remain the fundamentally more difficult problems of international co-ordination and co-operation. The most versatile machine can be designed given time and the normal conditions of technical progress. The intellectual and organizational problems of the use of these machines are as yet unsolved and are perhaps the greatest inhibiting factors for progress. R. G. Thorne [16] points out that 'Sophisticated systems can be expected to operate efficiently only on a co-operative basis in order to give greater use and to share the processing and search overheads'. And co-operation nowadays means not only internally but across national boundaries, with underdeveloped countries, in the whole framework of Technical Assistance. It has become an obvious truism accepted in principle, but disregarded in practice, that like peace documentation is indivisible.

Probably for Unesco the most useful method of promoting progress is not so much by financing a programme of research in automatic documentation, but rather in providing the organizational forms and the channels for the communication of the results of significant national projects. Two typical examples are the above-mentioned plans in the Gmelin Institute and the CNRS.

2.621. Gmelin Institute. The great effort both in capital investment and in staff time which the Gmelin Institute has decided to make in its mechanization programme will succeed if at least three conditions are met: (a) its technical methodology is sound; (b) its clientele is international and there is the closest co-operation with other national chemical services; (c) its special position in the field of inorganic chemistry is accepted. A possible pattern for such a control of a specialized subject might be the following. In all major industrialized countries there would be a deposit of duplicates of all the Gmelin punched cards at a suitable documentation centre. Selection equipment would there be available to process the cards, prepare bibliographies and carry out searches. As already mentioned, the Perry concept of automatic translation into the local language could be achieved through concordances of 'machine language'. Only in this way could the service become cheap enough for research workers in universities and in the underdeveloped regions to afford to use it.

Such a network of mechanical catalogues could only become an administrative reality with the support of the International Union of Pure and Applied Chemistry, working with Unesco through the International Council of Scientific Unions (ICSU). In general it pre-supposes some controlled co-ordination by an international body (Unesco through an advisory committee or an international federation of associations) which can smooth out differences as between the partners and 'impose' the decisions of a central authority. The ICSU Abstracting Board is an example of such a central authority.

Unesco's direct help could probably take two forms: (a) providing subsidies through ICSU, if necessary, for the developmental stages of such specific projects; (b) working towards the removal of administrative obstacles to the free flow of information. A typical case in point is that at present the Gmelin punched cards are held up in the American customs and are subject to a tax of almost 20 per cent. The best and most perfect system of automatic documentation will founder on the rocks of bureaucracy until it is accepted that information is information whether it is supplied in microfilm, punched cards or in the form of a book.

2.622. CNRS. A similar arrangement can be visualized for the establishment of depository collections of the micro-sheets corresponding to all the entries in the *Bulletin signalétique*. Actually already a microfilm copy of the tables of contents of the most important periodicals is sent by air from the CNRS to INSDOC in India to keep the *Insdoc list* as up-to-date as possible.

If the National Science Library in each country were to receive by air the full set of Filmorex micro-sheets and the selection equipment were available, a cumulative service for the *Bulletin signalétique* could be maintained. It could supply two alternative types of service: (a) for subscribers to the *Bulletin signalétique* a list of the reference numbers of all the relevant abstracts which have appeared on a desired subject for a given period (I realize, of course, that 'relevant' begs the whole question of automatic documentation); (b) photocopies, enlarged or not, of the micro-sheets that have been selected as covering the desired subject.

Proposal H. Unesco, working with the International Federations through its Advisory Committees (on Documentation) in Bibliography, Pure and Applied Sciences, Social Sciences, should establish and maintain the administrative procedures for the linking of national and international services which are making a contribution to the communication of recorded knowledge by subject.

PART II. THE OLDER TECHNIQUES

3. Concurrently with developing plans for 'new and revolutionary' methods in documentation there is still the whole domain of conventional practice in librarianship. How can traditional methods be modified and pushed further to the limit of their usefulness? Barbara Kyle says that 'In the social sciences, as in the small area of communication of information, and no doubt in science and technology also, it is important to keep proportion in developments in the three levels of bibliographic organization: the actual provision of literature throughout the world, the provision of adequate bibliographies, abstracts and guides to this literature, and finally the mechanizing of detailed information retrieval.

'At present failure to procure within a reasonable time what is brought to one's attention through bibliographical guides seems in the field of the social sciences to be about 20 per cent. The figure is much higher if the material sought is recently published. Clearly if bibliographical guides are improved at a faster rate than the provision of libraries and literature this percentage will rise; it can be regarded as a thermometer reading giving an indication of the rise in temperature of the frustrated research worker.'

3.1. THE PERIODICAL

A few months ago Pierre Bourgeois summarized one aspect of our problem in the form of a pertinent question: 'Le périodique scientifique est-il, dans sa forme actuelle, encore capable de remplir, d'une manière satisfaisante et économique, sa fonction d'agent principal dans l'information du savant et du chercheur?' [35].

J. D. Bernal by implication already answered 'No!' in 1948. His 'Provisional scheme for central distribution of scientific publications' [36] was not really fully discussed at the Royal Society Conference, since it was withdrawn partly as the result of strong protests made in letters to *Nature* [37] at the time. Although there is more support today for some such plan for rationalization, many of the 'psychological' objections still remain. They are partly inherent in the working habits of scientists, the way they use their literature, and the prestige patterns of scientific advancement and promotion.

An experienced opinion is given in his last annual report by S. A. Goudsmit [38], the editor of *Physical review*. This periodical is indeed typical for the range of problems that have been precipitated by the post-1946 history of nuclear physics. In spite of the fact that the authors of papers to *Physical review* must now pay $25 per page, the periodical has grown prodigiously. In 1946 it appeared in two volumes totalling 1,734 pages, in 1951 it became

four volumes (4,720 pages) and in 1956 it reached the total of 7,347 pages. The editor points out: 'So far . . . all proposals have been impractical or more expensive than the present procedure. A frequently proposed remedy is to furnish members with abstracts only and to sell reprints of the complete articles to those who request them. This was tried by the Physical Society of London but had to be abandoned because of the heavy financial burden. From now on we must, to our regret, become much stricter about the subject matter of articles. . . . To be acceptable a paper must contain a clearly expressed new physical idea or new measurements of physical quantities.'

What is suggested here as a remedy applies *mutatis mutandis* to all learned communications and is far from revolutionary or new—it is just good editorial practice. The problem is again an organizational and administrative one. How can science keep order in its own house? ICSU through its subject unions must exert pressure on all their constituent scientific societies to apply certain standards rigorously. The international organizations and the foundations must make their subsidies (these are becoming very considerable) conditional on periodicals reaching an essential minimum level. These periodicals must be up to the accepted international standards with respect to author synopses, annual and cumulative indexes and the other bibliographical desiderata to be discussed later. The same argument applies with even more force to the periodicals and bibliographical publications directly subsidized by, or actually prepared by, Unesco (see report by University of Oslo Library [39]).

For the social sciences and humanities Barbara Kyle cites the concrete example of how the Nuffield Foundation is providing subsidies for learned periodicals, conditional on the acceptance of professional advice on the best methods of printing, publication and distribution. 'If the Nuffield Foundation were to extend its influence to the *intellectual make-up* (not the content) *of journals*, still more benefits might follow. It might ask that editors of journals supported by Nuffield funds should (1) insist that authors of papers always supply synopses conforming to standards already established and glossaries of any new or controversial terms; (2) supply copies of the synopses and glossaries to editors of relevant abstracting or bibliographical journals, and (3) supply a number of offprints of articles to national and/or international documentation centres.'

The fact that the Physical Society found it uneconomic to distribute reprints in no way argues against such a central distribution scheme, as it represents only a partial situation—the provision of reprints on request being only one of the parts of such a scheme. Also the psychological objections have less force since the technical report has reared its ominous head as a form of limited publication. Report literature, as it has proliferated since 1948, is a sort of haphazard Bernal system with most of its disadvantages and few of its advantages. And yet scientists and engineers, particularly those working in government research establishments, are using it because of the speed it allows in exchanging information between workers in a narrow field. But reports, even de-classified reports, are in practice only available to a selected audience, not because of secrecy but as a result of the method of distribution. Therefore an important segment of information does not flow into the general body of scientific thought and, unlike periodicals, there is no way of making sure what proportion of the whole has been caught in the bibliographical net. This documentation disease is the direct result of the way in which atomic research has been organized since 1945. In effect scientists have accepted this form of communication, but always with the sustaining hope that the report issued in this limited way will eventually appear in a 'proper' periodical. This is partly the reason for the great pressure on periodical space. Thus the answer to Bourgeois' question is not that the periodical is still able to fulfil

its former role, but rather that is has been tacitly side-stepped. Yet scientists tend to behave as if it were *still* the only means of learned communication.

The report is only one of a number of forms of communication, both published and unpublished, which are different from the traditional periodical. That being so, it is necessary that the advantages of the Bernal system, or a modified version of it, be studied afresh in the light of the situation in the fifties. This would be a considerable undertaking as it involves all forms of primary publication as well as the related abstracting and indexing aspects (see Proposal L below).

3.2. ANNUAL REVIEWS OF PROGRESS

Although this is not a new form (*Reports on progress in physics* of the Physical Society of London started in 1934) its great value has resulted in its spread to many subjects, especially in the nuclear science field. Thus for example, *Progress in cosmic ray physics* appears once a year and contains longish articles by different authors, which previously might have appeared in the January issue of any general physics periodical. There it would have been abstracted. In its present guise it is excluded by most abstracting services. Such exclusions are not based on criteria of value of contents but rather on categories of form. Clearly these annuals should all be included in abstracting and indexing periodicals.

3.3. CONFERENCE PROCEEDINGS

Partly owing to the stimulation and financial assistance of international organizations like Unesco, WHO, FAO, the strengthening of professional and learned societies and the increasing importance of interdisciplinary fields of knowledge, the number of international and national conferences held annually has grown enormously. As usual, very little provision has been made for the bibliographical control of the resultant publications. There are numerous national calendars of proposed conferences, but there is no systematic key to where and when the proceedings of such conferences are published. If published in a periodical, they may be picked up by an abstracting service, but they are often not recognized as proceedings of a conference. If published in book or extended pamphlet form, they are all too often neither recorded under books or periodicals. Thus while the average good periodical article may be abstracted three or four times, the contents of proceedings of conferences, a great potential source of new and important information, remains inadequately recorded bibliographically.

3.4. TECHNICAL REPORT LITERATURE

The technical research report, although originally a war expedient, seems to have come to stay. In the U.S.A. more than 100,000 are produced annually, mainly by government-sponsored agencies. Their handling and subject control has been described and argued about at great length in American professional periodicals [40]. Most of the European nuclear energy establishments are now also using this form of rapid communication of results. In addition, since the Geneva Atomic Energy Conference, fairly complete depositories of the American reports have been established in a large number of countries all over the world. They are now less 'unpublished' than before and therefore constitute a really urgent problem of documentation. It is not known reliably to what extent they are taken up in international abstracting periodicals—probably only in a haphazard way, except for *Nuclear science abstracts* which was specifically designed to include them. But since technical research

reports include material in many subjects, mathematics, biochemistry, geology, electrical engineering, etc., in addition to physics and chemistry, their control is of immediate importance. As a first step the extent to which they are included by the major abstracting services must be established.

The documents, reports and series published, usually in 'near print', by such 'subject' organizations as Unesco, WHO, FAO, etc. contain material of direct concern to the social as well as the natural sciences. It is a sad commentary on these organizations, whose main purpose is communication and co-ordination as between Member States, that far too much of their work cannot be traced through the main abstracting services. In theory these documents are available to everyone through the national depositories; in practice the subject specialists are too often ignorant of their existence.

Proposal I. Arrangements should be made whereby their documents are regularly sent by the international organizations to the relevant abstracting periodicals for inclusion.

3.5. UNPUBLISHED MATERIAL

The difficulty of controlling unpublished material has even more serious implications for the social than for the natural sciences. The following is Barbara Kyle's summary of the main problem and her suggested solutions (see also [41]). There are 'four categories of material: (a) pre-publication material; (b) by-products, raw material, data, tables, etc.; (c) limited distribution material; (d) conference literature'.

By pre-publication material is meant: "MSS., proofs and works in the press. Now it is widely assumed that everything of "real" importance does eventually get published. This is probably true to a large extent. But we know that there is often a time-lag of from 6 to 18 months between the date on which the author writes "finis" and the date on which his published work actually appears. Finally, research workers in the van of progress depend very largely on material that is less than 5 years old. This means that at any given date 10 to 30 per cent of the most important material is, in this sense, unpublished. And the more recent the material required the greater the proportion of it that is not available.'

Raw material includes data and statistical tables not included in published reports of research. Examples of this are: (a) the punched cards on which are recorded the various characteristics of a sample survey of population in Manchester; (b) 'Supplementary statistics relating to crime and criminal proceedings', mimeographed and available on application from the Home Office in connexion with its publication, *Criminal statistics: England and Wales, 1955*. 'Material distributed to a restricted public may or may not be printed or published but usually escapes listing in published bibliographies: this is a very large, varied, and important category of material. It may include such items as U.N. Technical Assistance Administration restricted documents (not confidential), or the Italian branch of the Shell Petroleum Company's report on economic development in a district of Southern Italy'.

Conference literature includes pre-prints, extra papers handed in at the conference proceedings and lists of delegates.

Proposal J. In each country there should be one overall social science centre to which should come lists of specialists, lists of research in progress, and information about conferences. This centre should also be informed of the location of unpublished material. The Unesco Social Science Clearing House should co-ordinate the activities of all social science centres. Lists of delegates to conferences (including their addresses) should be incorporated with lists of specialists into the Unesco Social Science Clearing House files.

3.6. ABSTRACTING IN THE SOCIAL SCIENCES (BARBARA KYLE)

'The provision of abstracts for social scientists at present is so meagre that there is probably little overlapping, but as provision increases it will be important to plan for essential overlapping and to avoid accidental waste. It might well be that the seminal idea for an economist, in an article on industrialization in newly developed communities, would be lost in an abstract aimed at the social psychologist. More rigorous selection of material for abstracting and more accurate abstracting should be established.'

There are no standards for the writing of synopses of articles in social science periodicals comparable with those drawn up for the natural sciences by the Royal Society and widely distributed by Unesco [42]. Since there are no Social Science Research Councils in a number of countries it may be necessary to initiate a standard at the international level.

Proposal K. A draft of a standard for preparing abstracts of social science literature should be prepared by the International Committee for Social Sciences Documentation and circulated to all international and national social science associations as well as to editors of periodicals.

3.7. TRANSLATIONS

More and more, documentation centres have to accept the responsibility for the provision of translations either directly or by loan or purchase. This practice has increased greatly since governments everywhere are committing themselves to the use of nuclear energy. A direct result, for example, is that from this year complete translations of the four leading Russian physics journals are available on subscription in the U.S.A. and others are following in Europe.

To spread the heavy costs of translation, indexes of translations are being maintained in the U.S.A., Great Britain, France, Germany, to mention only the larger countries, and also in the Science Documentation Centres in Mexico and India. Inevitably there is a considerable time lag in the recording of translations or their deposit in translation pools. There will always be duplication and waste, but it could certainly be reduced by prompter indexing on an international scale. Though some translations from abroad are deposited in a few national centres, recording is essentially national. If one needs a translation of a Russian paper into say English, the fact that a French translation can be obtained through the Index at the CNRS, or a German translation from the Zentralstelle für wissenschaftliche Literatur in Berlin, would in many cases make an expensive local translation unnecessary.

Clearly an international list of translations, published and unpublished, available in a periodical or only in typescript, is an urgent necessity. The Unesco Department of Natural Sciences has a special responsibility for questions of terminology and translation and is probably the most suitable agency to undertake such an International Index. It would need very good arrangements with national centres for reporting with a minimum of delay all translations completed or under way. The list should appear each month with regular cumulations, giving preferably an arrangement by broad subject and an author index. To achieve the necessary flexibility, compilation by punched cards is likely to be the most efficient method (see Proposal C, page 164).

Proposal L. In view of the increasing inadequacy of the scientific periodical as a method of communication, a long-term study of the whole problem should be commissioned. Its terms of reference should include the following aspects: (a) a plan based on Bernal's scheme for the central distribution of scientific publications (modified where necessary) and a preliminary investigation of its acceptability to scientists; (b) the relationship

of the technical research report to the traditional paper in scientific periodicals and its integration into the abstracting and indexing structure; (c) consideration of what in principle should be accepted as 'constituting publication' (academically, legally and copyright point of view) in relation to the 'unpublished scientific report' and the various levels of security classification.

Proposal M. With the help of the ICSU Abstracting Board a survey should be made of the extent to which the *major* abstracting and indexing services (in the natural sciences) include in their periodicals (a) the articles in annual reviews of progress; (b) technical research reports. The results should be published in the *Unesco bulletin for libraries* and given wide distribution.

Proposal N. Lists indicating where and when the proceedings of international conferences have been published should be issued regularly. The responsibility for compilation could be undertaken either by ICSU (for science and technology), the International Social Science Council (for social sciences) and the International Council for Philosophy and Humanistic Studies (for the humanities), or the three Unesco International Advisory Committees.

3.8. NUCLEAR ENERGY DOCUMENTATION

The traditional disciplines in science and technology are organized bibliographically to some extent—some better than others. The large scale use of nuclear energy, which is a technology including not one but a large number of disciplines, has suddenly imposed a range of new problems for those countries now entering into the field. Since the Geneva Conference in 1955 smaller countries have started to assemble the literature needed for the initiation of nuclear energy programmes. The methods of control of nuclear energy literature used in the pioneer countries are still in a state of flux, but there is already a great deal of experience to draw upon. This experience should be shared and made available and where possible lead to some agreed standard practice.

Proposal O. Unesco, in co-operation with the United Nations, should convene a meeting of experts from all countries with nuclear energy programmes. These documentalists should collate and analyse the present methods in the production, control and distribution of the literature of nuclear energy, and suggest possible standards of recommended practice.

4. SUBSTITUTES FOR ORIGINALS

The Royal Society Conference included among its recommendations that 'Aslib or some other organization should be asked to explore the possibility that societies, libraries, commercial enterprises, or other organizations might act as agencies for obtaining and distributing separates'.

For a number of reasons the reprint situation has become more difficult in recent years and the need for some co-operative action is urgent. The use of reprints is part of the pattern of how scientists work; it is their personal channel of communication and has increasingly become an exchange medium for learned libraries, especially in Europe. In fact a pre-print system has been grafted on to the scientific periodical, especially in the U.S.A. Papers are multigraphed and distributed to colleagues at the same time as they are submitted for publication to a periodical.

On the other hand, with increased costs of printing and the high costs of make-ready, reprints are expensive and the number given to authors is now not much more than a few dozen. Single issues of periodicals soon go out of print and their procurement is bound up with wasteful overhead charges both for libraries and booksellers. In practice this has led to photo-copying on an

ever-increasing scale, in spite of the copyright bars in some countries. It is basically inefficient that scores of libraries in any one region should each make a negative of the same important article, so that they can produce positive copies for their readers. The theory is that they should obtain microfilms from a national centre and use microfilm readers. The practice in most special libraries in research institutes and in industry is to provide photocopies, because of user resistance to microfilm.

For this purpose there is perhaps too much bias towards using microcopying rather than the cheaper dye-line methods of copying. The following plan would avoid copyright difficulties and provide a steady supply of reprints at low cost. It is based on a simple method first described by F. Donker Duyvis [43] in 1940 and now used fairly widely in the Netherlands. At the time of printing of each issue of a periodical an extra copy is made on transparent paper. From this copy dye-line copies of any article can be made at the very low cost of about 8 Swiss centimes per page (A4).[1] The periodical is thus always in print without maintaining any stocks. This method could be extended internationally, and could also be used for unpublished typewritten translations.

At a designated documentation centre in each country or region there would be deposited a copy of the most important periodicals in the form of transparent sheets. These would be sold in the ordinary way by the publishers. Anyone requesting a reprint would receive it as a dye-line copy at a low cost per page including a small copyright charge, which would revert at reasonable intervals to the publishers. It would in no way affect the present economics of production, as libraries and individuals would continue to subscribe to their periodicals as before. The main difficulty would probably be to persuade publishers to print the additional transparent copies. It would need the sponsorship of scientific societies and libraries in the main user countries.

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Just issued

UNESCO PUBLIC LIBRARY MANUALS, No. 9

PUBLIC LIBRARY SERVICES FOR CHILDREN

BY

LIONEL R. MCCOLVIN

Unesco has been reminded many times during the past few years by librarians and others that the world needs a book on public library services for children written from an international rather than a national point of view, and particularly adapted for countries where libraries are in an early stage of development. In response to repeated expressions of this need, Unesco commissioned Mr. Lionel R. McColvin to write this book, which it is hoped will give practical guidance and encouragement to librarians, teachers, local and national government officials and others throughout the world who are in any way concerned with the development of public library services for children.

The author is City Librarian of Westminster (United Kingdom) and Vice-President of the International Federation of Library Associations. He has written many books on libraries, including *Public Library Extension*, an earlier volume in this series.

103 pages; illustrated. Price: $1.50; 8/-; 400 *fr.*

NEW PUBLICATIONS

BIBLIOGRAPHY AND DOCUMENTATION

(276) SHERA (Jesse H); KENT (Allen); PERRY (James W), ed. *Documentation in action*, based on 1956 Conference on documentation at Western Reserve University. New York, Reinhold Publishing Corporation, 430 Park Avenue; London, Chapman and Hall, 37-39 Essex Street, 1956. 471 p. 23×16 cm.

Contains the proceedings of the Conference on the Practical Utilization of Recorded Knowledge, held at Western Reserve University, Cleveland, Ohio (U.S.A.) in January 1956. The record is divided into five main parts as follows: seven chapters recapitulating the 'state of the art' in each of the areas defined by the original planning group as being basic to the deliberations of the Conference; six chapters giving 'The main prospectuses in the areas of machines, education, systems, co-operation and language as they can be expected to contribute to solving the problems of effective communication through the written record'; four chapters summarizing the panel discussions; eight chapters presenting the conclusions reached at the closed meetings held to discuss co-operative programmes in metals, pharmaceuticals, petroleum, documentation, patents and machine translation. Finally, one chapter summarizing the conclusions of the planning group with regard to the definition of areas for future research.

(277) *Periodičeskaja pečat' SSSR. 1917-1949. Bibliografičeskij ukazatel'. Žurnaly, trudy i bjulleteni* . . . (U.S.S.R. periodical press, 1917-49, bibliographical index, journals, studies and bulletins . . .). Moskva, Vsesojuznaja Knižnaja Palata, 1955-56. 26×17 cm.

This systematic union index published by the All-Union Book Chamber in separate volumes for different subject-groups constitutes a universal reference book on the periodicals (with the exception of newspapers) issued in all languages in the U.S.S.R. during 1917-49. Each volume includes alphabetical indexes and indicates for each journal place of publication and publishing organization. The last volume will contain a general index for the whole series. Volumes covering journals in the following subjects have already appeared: natural sciences and mathematics, 220 p., 12 roubles; transport, communications and local administration, 123 p., 9.50 roubles; agriculture, 230 p., 14 roubles; cultural activities, public education and instruction, 198 p., 11 roubles; technology and industry, 318 p., 17 roubles; public health, medicine, physical culture and sport, 171 p., 9.60 roubles.

Volumes covering journals on the following subjects will appear shortly: social sciences, politics and economics; linguistics, literature and art; publishing and bibliography.

(278) *Yeni yayinlar: aylik bibliografya dergisi*. Cilt: II, Sayi: 2, Subat 1957. Ankara, Yeni Yayinlar, Aylik . . . P.K. 60 Yenimahalle. Annual subscription: 7 Turkish pounds.

A monthly bibliographical journal now in its second year listing new Turkish publications, both original works and translations from other languages. Entries are arranged alphabetically by subject. Each issue contains a few news and information items.

(279) COSTA RICA. BIBLIOTECA NACIONAL. *Boletín bibliográfico: algunas de las publicaciones nacionales correspondientes al año 1955.* San José, Imprenta Nacional, 1956. 40 p.

A bibliography of most of the publications issued in Costa Rica in 1955. Includes books and pamphlets, reviews and bulletins, and newspapers. Entries are arranged in alphabetical order of authors' names.

(280) *Books from the U.S.A., news of current U.S. books and book publishing.* Vol. I, no. 1, January 1957. New York, R. R. Bowker Company, 62 W. 46th St. 48 p. Annual subscription: Canada and the U.S.A.; $7.50; other countries $1.50 by surface mail, air rates on application.

Sponsored by the American Book Publishers Council, this new monthly periodical lists recent U.S. publications which are most likely to interest readers of English throughout the world, the material being specially selected for an overseas public. The descriptions of books listed are adapted from the book reviews prepared from advance copies and published in the *Library ournal.*

LIBRARIANSHIP

(281) INTERNATIONAL FEDERATION OF LIBRARY ASSOCIATIONS. *Actes du Conseil de la FIAB, 22e session, Munich, 3-4 septembre 1956.* La Haye, Martinus Nijhoff, 9 Lange Voorhout, 1957. 162 p. 27×18,5 cm. 17 Swiss francs. (*Publications*, vol. XXI.)

Contains the proceedings of the twenty-second session of the IFLA Council which was attended by 68 delegates representing 33 member associations from 21 countries, four international organizations and 29 observers. It includes 29 annexes comprising reports on union catalogues in five countries, international loan, and national library development in over 20 countries.

(282) VAN AELBROUCK (André). *Éducation populaire et bibliothèques publiques: les conditions historiques, sociales et psychologiques de leur évolution.* Bruxelles, Éditions de la Librairie Encyclopédique, 7, rue du Luxembourg, 1956. 182 p. 24×15,5 cm. 150 Belgian fr.

In the first chapter of this book the author gives an historical survey of the development of popular and adult education and public libraries in Belgium. The second chapter, dealing with the psychology of the Belgian people, shows the important role this has played and is still playing in the structure of teaching and education in the country. The third chapter deals with present social conditions, intellectual life and educational trends in Belgium, giving statistics on the population, illiteracy, number of students attending teaching establishments at different educational levels, evening and correspondence classes, public libraries, press, cinema, wireless, television, amusements, religions, etc. The last chapter concerns future prospects. A bibliography lists 162 references.

(283) BOND (T. T.). *The Use of stitched-binders in the maintenance and repair of library books.* Auckland, Bayard Book Co., Highbury, 1956. 95 p. 19,5×13 cm. 12s. 6d. net.

This manual of instruction for the repair of library books describes, step by step, the stitched-binder method which is used in the bindery of the Auckland Central Library (New Zealand). It also gives the background to the whole problem of making books give better service under lending library conditions. The author expresses the view that this can be done by improved methods of production and suggests the form that a much improved type of book could take.

An appendix by Wynne Colgan gives an account of library development in New Zealand with statistics on the book stocks of all the more important libraries.

NEWS AND INFORMATION

(284) EXCHANGE OF DUPLICATE PUBLICATIONS

In January 1955, the Unesco Libraries Division transferred to national exchange centres which had agreed to undertake such work the main responsibility for supplying information on international exchange possibilities to libraries and institutions in their country. The addresses of centres which co-operate in this scheme are listed in each double number of the *Unesco bulletin for libraries*. However, there are still a number of countries where the national exchange centres do not participate in the project or where no exchange centres exist. As far as Unesco resources allow, the Libraries Division assists libraries in those countries to exchange their duplicate and surplus publications, mainly by publishing short notices concerning their offers in the *Bulletin*, but also, to a limited extent, by circulating short lists of titles to libraries which might be interested, and by helping to meet transport costs. Libraries having duplicate publications available for exchange are invited to write to the Unesco Libraries Division for further details of this scheme.

(285) ASIAN SEMINAR ON EXCHANGE OF PUBLICATIONS IN JAPAN

The National Diet Library, Tokyo, Japan, in co-operation with the Japanese National Commission for Unesco, interested Japanese professional bodies and Unesco, will hold on 4-11 November 1957 a regional seminar for the Indo-Pacific Area on the international exchange of publications and bibliography. (See *Bulletin*, vol. XI, no. 5-6, item 209.)

Two participants will be invited to attend from each of the following countries: Afghanistan, Australia, Burma, Cambodia, Canada, Ceylon, Chile, Republic of China, Colombia, Ecuador, Hong Kong, India, Indonesia, Republic of Korea, Laos, Malaya-British Borneo Group, Mexico, Nepal, New Zealand, Pakistan, Panama, Peru, Philippines, Thailand, United States of America, Union of Soviet Socialist Republics and Viet-Nam. The cost of board and lodging for participants during the seminar period will be borne by the National Diet Library, but travel expenses to and from the seminar will have to be paid by participants themselves or their governments.

The agenda for the seminar contains three parts: the present situation of the international exchange of publications in the Indo-Pacific region and its improvement; problems concerning the establishment and management of national exchange centres; and bibliographical problems relating to exchanges.

Further details may be obtained from the Division of International Affairs, National Diet Library, Akasaka, Minato-Ku, Tokyo, Japan.

(286) UNESCO ASSOCIATED PROJECTS: ARGENTINA

The Domingo Faustino Sarmiento Library of the National Postal Savings Bank (Caja Nacional de Ahorro Postal), calle Hipólito Yrigoyen 1750, Buenos Aires, has recently been accepted as a Unesco associated project.

This library was founded in April 1949 to serve both as a public library and as a specialized library on savings and insurance and all other subjects of interest to the bank. It has reading and reference rooms, a loan service and a children's library, and its collections include 25,000 books and periodicals for adults, 1,000 children's books, 650 gramophone records, 130 16 mm. films (a specially equipped van enables these to be shown in the street or in schools). During 1956 (up to

October) the 26 members of the library's staff dealt with 61,614 adult readers, and 5,969 children; and 71,414 books were lent out. The library's activities for children include film shows, art competitions, puppet theatre shows worked by the children themselves, and musical concerts.

Library authorities and librarians interested in the programme of associated projects should write to the Libraries Division of Unesco, 19 avenue Kléber, Paris-16e, France, for a copy of *Unesco associated library projects*, which gives full details of the scheme.

(287) NEW INSTITUTE OF LIBRARIANSHIP AND BIBLIOGRAPHY (MOSCOW)

In accordance with the instructions of the Minister of Culture of the Russian Soviet Federal Socialist Republic, Mrs. T. M. Zueva, a 'Scientific Research Institute of Librarianship and Bibliography' is being organized in the Lenin State Library of the U.S.S.R. in Moscow.

The purpose of the new Institute is to deal with the basic problems of librarianship and bibliography by studying and applying the latest experience of Soviet and foreign libraries, with a view to improving the standard of work in these fields in the U.S.S.R.; and to compile a bibliography of recommended works and general systematic bibliographical aids. To this end, the Institute is working on questions of the theory, methods and history of library work and bibliography; studying, applying and helping to publicize the latest experience of Soviet and foreign libraries; affording libraries assistance on technical problems, arranging for services of library publications, etc.

The Institute will publish monographs on individual problems of librarianship and bibliography, studies, and collected works. It is also to be responsible for preparing bibliographical aids drawing attention to recommended works for public libraries and children's libraries (annotated cards, model catalogues, indexes, etc.), and general systematic bibliographical aids (union catalogues, bibliographies of bibliographies, bibliographies of theses, information bulletins, etc.). The Institute will help to improve the qualifications of library staff and persons engaged on bibliographical work by compiling practical handbooks, study syllabuses and plans for courses and seminars organized for public library workers.

(288) SPECIAL SUBJECT LISTS

The Library Association, London, issues a series of monthly lists, dealing with topical subjects of either a technical or a general nature, which provide a useful and inexpensive means of building up bibliographies of subjects of current importance. The lists, being on current subjects, contain references to a large number of periodical articles which may not be easily traced in a general library. Compiled by librarians professionally concerned with the subjects or personally interested in them, the lists are intended primarily for the use of reference librarians in public libraries.

The annual subscription for these lists is 12s. and individual copies may be obtained at either 1s. 3d. or 2s. 6d. according to the size of the list. The latest list deals with *Eleven-plus: selection for secondary education and comprehensive schools* and contains some 80 references (price, 1s. 3d.). Other recent titles still available include: *Malta* (1s. 3d.); *United States Presidency* (1s. 3d.); *Special steels* (1s. 3d.); *Church unity* 1948-56 (1s. 3d.); *Phototypesetting* (2s. 6d.); *Cybernetics* (1s. 3d.). Subscriptions and requests for further information should be sent to the Secretary, The Library Association, Chaucer House, Malet Place, London, W.C.1.

(289) AN APPEAL BY THE POLISH ACADEMY OF SCIENCE

The Polish Academy of Science is launching an appeal for records of material in archives, manuscripts, typescripts, collections of drawings, maps, plans, sketches, etc., concerning the scientific and other creative activities of Poles, and their contribution to world science and culture, more particularly between

the sixteenth and twentieth centuries.

The successive wars on Polish territory have taken heavy toll of the country's archives, libraries and other collections, from which valuable documents, correspondence, and so on have been lost. The stormy history of the Polish people, who lost their national independence at the end of the eighteenth century, to recover it only at the beginning of the twentieth, drove the Poles to every corner of the earth. Through their individual activities, however, or their work in scientific institutions in the countries in which they have found refuge, the Poles have done much to enrich the cultural and scientific life of their day.

The Polish Academy of Science is hoping to discover valuable material in archives, libraries, museums and other collections throughout the world, that will shed light on the intellectual creativity of Poles. Any preliminary information it may receive will enable it to fill in large gaps in its existing documentation and to arrange for more extensive research with the help of such modern technical media as microfilms.

Information should be sent to the Archives of the Polish Academy of Science, Nowy Swiat 72, Warsaw, Poland.

(290) FILM ON LIBRARIES

Librarianship as a profession. A 16 mm. 12-minute black and white film on librarianship produced for the Canadian Library Association by Crawley Films Limited, Ottawa, under the direction of Mr. George Gorman. The film is being used by the Canadian Library Association in connexion with the five-year 'Recruitment for Librarianship' campaign which it is launching this year. It has been planned for use by a speaker who will answer questions and discuss topics of particular interest. Four recruiting leaflets, illustrated with photographs from the film, are available for use with the film; obtainable from The Canadian Library Association, 46 Elgin Street, Ottawa, Canada, price $50.

(291) A FRENCH LENDING LIBRARY FOR RECORDS

On 19 February 1957, the Municipality of Neuilly opened a public lending library for records, as a branch service of its Municipal Library. This is the first service of the kind to be established in the Paris area and probably in the whole of France.

Its users can now familiarize themselves, without any great outlay, with generally less known classical and modern music. They can discover the rich store of folk music from all over the world and hear masterpieces of literature from the lips of the greatest actors.

Those in charge of the new service have incidentally found an apt phrase to define their musical policy, which is to make known 'the minor works of major composers and the major works of minor composers'.

(292) SCIENTIFIC AND TECHNICAL DOCUMENTATION DIVISION (EGYPT)

According to a law recently passed by the Egyptian Government concerning the organization of the National Research Council of Egypt, the Scientific and Technical Documentation Centre, which, with the co-operation of Unesco, had been created in 1954 as part of the Council (see *Bulletin*, vol. IX, no. 2-3, item 105), is now called the Scientific and Technical Documentation Division. The existing services: library, documentation, bulletin, photoreproduction, bibliographical and translations have been transformed into units, but they carry on the same activities as previously. New units will be created when necessary to make the service as complete as possible for all Egyptian research workers, professors and students, industrialists, etc.

Starting with vol. 3, no. 3, March 1957, the title of the *Bulletin* published by the Centre has been changed to *Documentation bulletin of the National Research Centre of Egypt.*

Dr. A. Perez Vitoria (Spain), Mr. J. Garrido (Spain) and Mr. W. Goodson (Canada), Unesco experts sent out under the Technical Assistance programme, are continuing to advise and co-operate with the newly named Division.

EXCHANGE

The exchange offers listed below supplement material published in the *Handbook on the international exchange of publications*, 2nd edition. Libraries having publications available for exchange which are not already mentioned in the *Handbook* are requested to send details to the Unesco Clearing House for Libraries. As space permits, the information will be published in this section of the *Bulletin*.

BELGIAN CONGO

(293) UNIVERSITÉ LOVANIUM, B.P. 2158, Léopoldville,

Offers the following publications for exchange:

Publications de l'université

1. Vanhoutte, M. *La Méthode ontologique de Platon*, 1956.
2. Bezy, F. *Problèmes structurels de l'économie congolaise*, 1957.
3. Dopp, P. H. *Le Traité d'Emmanuel Piloti sur l'Égypte (incipit 1415)*, 1957.
4. Buchmann, J. *A la recherche d'un ordre international*, to appear in August 1957.

Recueil de travaux, Série B, Sciences

1. Bouillon, A. *La Fécondité chez l'araignée Latrodectus geometricus C. Koch*, 1957.
2. —. *Les Fonctions du cocon chez l'araignée Latrodectus geometricus C. Koch*, 1957.
3. —. *La Sex-ratio chez l'araignée Latrodectus geometricus C. Koch*, 1957.

and scientific papers written by professors of the different faculties and institutes of the University: Law, Philosophy and Letters, Theology, Sciences, Medicine, Political, Economic and Social Sciences, and Pedagogy.

CUBA

(294) BIBLIOTECA DEL INSTITUTO NACIONAL DE CULTURA, Ministerio de Educación, La Habana,

Offers for exchange:

Revista Cubana.

Revista del Instituto Nacional de Cultura.

HUNGARY

(295) KÖZPONTI STATISZTIKAI HIVATAL KÖNYVTÁRA (Library of the Hungarian Central Statistical Office), Keleti Károly utca 5-7, Budapest II,

Offers its review *Statisztikai szemle* and other Hungarian statistical publications (list on request) for exchange. It also offers duplicates of official Hungarian statistical publications (list on request) in exchange for similar official or non-official publications.

INDIA

(296) INDIAN CERAMICS, 17 Sourin Roy Road, Behala, Calcutta 34.

This monthly journal dealing with the pottery, enamelling, glass, cement and allied ceramic industries is offered in exchange for similar technical journals.

(297) BISWABANEE, Educational and Cultural Organization, 12 Duttapara Lane, Bhadrakali, Hooghly, West Bengal,

Offers the following publications in exchange for publications on history, biology, hygiene, arts, physiology, economics, medicine, social sciences, education, cultural activities, literature, etc.:

Blair, W.; Gerber, J. *Factual prose*, 1949.

—. *Literature.*

Daugherty, C. R. *Labour problem in American industry*, 1948.

Glos, R. E.; Baker, H. A. *Introduction to business*, 1947.

Ideas and forms in English and American literature. Vol. I, *Poetry.* Vol. II, *Drama and prose*, by Watt and Munn.

Johnson, C. O. *American national government*, 1954.

Munn, N. L. *Psychology*, 1946.

Nelson, M. J. *Educational psychology*, 1941.

Newman. *Business principle and management*, 1949.

Noble. *American principles*, 1945.

Ogg, F. A.; Ray, P. O. *American government*, 1950.

Robinson, J. H. *History of Western Europe*, 1934.

Ruch, F. L. *Psychology and life*, 1948.

Shaffer, L. F.; Gilmer, B. von H.; Schoen, M. *Psychology*, 1940.

Staples, Z. C.; York, G. M. *Economic geography*, 1940.

INDONESIA

(298) LEMBAGA PENJELIDIKAN MASALAH BANGUNAN (Regional Housing Centre), Djalan Tamansari 124, Bandung,

Offers its quarterly official journal *Masalah bangunan* in exchange for publications on building and social sciences.

POLAND

(299) INSTYTUT ZACHODNI, Instytut Badawczo-Naukowy, ul. Chełmońskiego 1, m 7/8, Poznań,

Offers for exchange reprints from *Przegladu Zachodni*, dealing with all aspects of West Poland.

(300) BIBLIOTEKA GŁÓWNA WYZSZEJ SZKOŁY EKONOMICZNEJ W SOPOCIE (Bibliothèque principale de la Haute École Économique à Sopot), 27 gen. K. Swierczewskiego, Sopot,

Offers the following publication in exchange for publications on economy, especially maritime economy and maritime law:

Zeszyty naukowe wyzszej szkoły ekonomicznej w Sopocie. Zeszyt 1: Gospodarka morska.

SPAIN

(301) CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS, Cambio Internacional, Serrano 117, Madrid,

Organizes the exchange of periodical publications issued by the 178 research centres which come under it. The following titles are offered:

GENERAL AND BIBLIOGRAPHY

Arbor
Biblioteca general.
Biblioteca Hispana.
Boletín de información documental.

PHILOSOPHY, THEOLOGY, PEDAGOGY

Bordón.
Estudios bíblicos.
Estudios pedagógicos.
Hispania sacra.
Missionalia Hispanica.
Revista española de derecho canónico.
Revista española de pedagogía.
Revista española de teología.
Revista de filosofía.
Revista de ideas estéticas.

LAW, ECONOMICS, SOCIOLOGY

Anales de economía.
Revista española de derecho internacional.
Revista internacional de sociología.

PHILOLOGY, LITERATURE

Al-Andalus.
Anales Cervantinos.
Emerita.
Estudios clásicos.
Revista de dialectología y tradiciones populares.
Revista de filología española.
Revista de literatura.
Sefarad.

NATURAL, EXACT AND PHYSICAL SCIENCES

Arquímedes.
Boletín del Observatorio de Cartuja.
Boletín del Observatorio del Ebro.
Boletín de radioactividad.
Collectanea mathematica.
Estructuras.
Gaceta matemática.
Revista de geofísica.
Revista matemática Hispano-Americana.
Trabajos de estadística.
Urania.

MEDICAL SCIENCES.

Anales hispano-americanos de hidrología médica y climatología.
Archivo español de morfología.
Archivo Ibero Americano de H° de la medicina y antropología médica.
Archivos de medicina experimental.
Medicina tropical.
Revista española de fisiología.
Trabajos del Instituto Cajal de Investigaciones biológicas.

(Other titles will be published in a subsequent issue of the *Bulletin*).

UNITED STATES OF AMERICA

(302) CITY LIBRARY ASSOCIATION, 220 State Street, Springfield 5, Massachusetts,

Provides its young readers of high school age with scientific books containing significant and interesting terminology, and which differ from the more literary works they find in school. The library offers these American scientific books in exchange for similar books from other countries in French, German or Spanish.

YUGOSLAVIA

(303) BIBLIOTEKA NA ZEMJODELSKO-ŠUMARSKIOT FAKULTET, NA UNIVERZITETOT, SKOPJE (Faculty of Agriculture and Forestry Library), Skopje,

Offers the *Annuaire de la Faculté d'agriculture et de sylviculture de l'Université de Skopje* (Séries: *Agriculture et sylviculture*) in exchange for publications on agriculture and forestry.

NATIONAL EXCHANGE CENTRES

The following national centres for the international exchange of publications co-operate with the Unesco Clearing House for Libraries in making available lists of publications offered for free distribution and exchange by libraries and other institutions.

Questions concerning the development of exchanges of publications in these countries should be sent directly to each Centre at the address given below.

AUSTRALIA
Commonwealth National Library, Commonwealth Publications Exchange Agency, CANBERRA, A.C.T.

AUSTRIA
Internationale Austauschstelle, Oesterreichische Nationalbibliothek, Josefplatz 1, WIEN.

BELGIUM
International Exchange Service, Bibliothèque Royale, 5 rue de la Régence, BRUXELLES.

BRAZIL
Seção de Permuta Internacional, Biblioteca Nacional, av. Rio Branco 219/239, RIO DE JANEIRO.

BULGARIA
Bibliothèque d'État 'Vassil Kolarov', Tolbuhin 11, SOFIA.

CANADA
National Library, Public Archives Building, OTTAWA 2.

DENMARK
Danmarks Institut for International Udveksling af Videnskabelige Publikationer (IDE), Det Kongelige Bibliotek, KØBENHAVN K.

FRANCE
International Exchange Service, Bibliothèque nationale, 65 rue de Richelieu, PARIS.

FEDERAL REPUBLIC OF GERMANY
Internationale Austauschstelle, Deutsche Forschungsgemeinschaft, Frankengraben 40, BAD GODESBURG B/BONN.

GERMAN DEMOCRATIC REPUBLIC
Internationale Austauschstelle, Deutsche Staatsbibliothek, Unter den Linden 8, BERLIN, N.W.7.

GREECE
Ministry of National Education, Directorate of Letters, Library, 2 Evanghelistrias, ATHENS.

GUATEMALA
International Exchange Service, Biblioteca Nacional, 10a, Calle 9-31, GUATEMALA.

HUNGARY
International Exchange Service, Országos Széchényi Könyvtár (Széchényi National Library), Museum-Körut 14-16, BUDAPEST VIII.

INDIA
National Library, Belvedere, CALCUTTA.

IRAN
Service des échanges internationaux, Kétab Khané e Melli, 74 Ghavam-Saltaneh, TEHERAN.

IRAQ
Department of Cultural Exchange, Directorate General of Cultural Affairs, Ministry of Education, BAGHDAD.

ISRAEL
International Exchange Centre, Jewish National and University Library, P.O.B. 503, JERUSALEM.

ITALY
Ufficio per gli scambi internazionali, Via Milano 72-76, ROMA.

JAPAN
International Exchange Service, National Diet Library, TOKYO.

LUXEMBOURG
International Exchange Service, Bibliothèque nationale, 14a boulevard Royal, LUXEMBOURG.

MEXICO
Centro de Documentación Científica y Técnica, Plaza de la Ciudadela No. 6, MEXICO, D.F.

NETHERLANDS
International Exchange Service, Koninklijke Bibliotheek, Kazernestraat 39, 's-GRAVENHAGE.

NORWAY
International Exchange Service, Universitetsbiblioteket, 42b Drammensveien, OSLO.

PAKISTAN
International Exchange Service, Directorate of Archives and Libraries, Government of Pakistan, Block No. 76, KARACHI.

PHILIPPINES
Committee on the Exchange of Informational Materials, c/o Unesco National Commission, 1580 Taft Ave., MANILA.

POLAND
Service Polonais des Échanges Internationaux, ul. Okolnik 9, WARSZAWA.

PORTUGAL
International Exchange Service, Biblioteca Nacional, LISBOA.

RUMANIA
Serviciul de schimb cu străinătatea, Biblioteca Centrală de Stat a R. P. R., Calea Rahovei, nr. 4, BUCURESTI I.

SPAIN
Servicio Nacional de Lectura, Cambio Internacional de Publicaciones, avenida de Calvo Sotelo 20 (Biblioteca Nacional), MADRID.

SWEDEN
Kungliga Biblioteket, STOCKHOLM 5.

SYRIA
Service des échanges internationaux, Direction des Relations Culturelles, Ministère de l'Instruction Publique, DAMAS.

TURKEY
International Exchange Service, Bibliographical Institute, Millî Kütüphane, ANKARA.

UNION OF SOUTH AFRICA
Office of the Chief Librarian, Department of Education, Arts and Science, Van der Stel Buildings, PRETORIA.

YUGOSLAVIA
International Exchange Centre, Bibliografski Institut FNRJ, Terazije 26, BEOGRAD.

FREE DISTRIBUTION

FRANCE

(304) BIBLIOTHÈQUE DU CONSEIL D'ÉTAT, Place du Palais-Royal, Paris,

Offers the following volumes of the *Petits précis Dalloz:*

Précis de droit administratif, 1943, 8e éd.; 1947, 9e éd.

Précis de droit commercial, 9e éd., addendum de mise à jour 51.

Précis de droit criminel, 1939, 7e éd.; 1946.

Précis de droit maritime, 1947, 4e éd.

Précis de droit international privé, 1946, 4e éd.; 1948, 5e éd.

Précis de droit des pays d'outre mer, 1949.

Précis de droit romain, 1946, 2e éd.

Précis d'histoire du droit français, 1945, 4e éd.

Précis de législation industrielle, 1947, 2e éd.; 1948, 3e éd.

Précis de procédure civile et commerciale, 1946, 9e éd.

Précis de science et de législation financières, 1947, 9e éd.

Précis des voies d'exécution et des procédures de distribution, 1943, 5e éd.

(305) UNION OF INTERNATIONAL ENGINEERING ORGANIZATIONS, 49, rue Galilée, Paris,

Offers: *Multilingual technical vocabularies published by member organizations of U.A.T.I.*, 1957, 12 p.

UNITED KINGDOM

(306) REFERENCE LIBRARY, CENTRAL LIBRARY, Leeds, I,

Offers free to libraries willing to pay the transport cost:

Acts of the Lords Auditors of causes and complaints. A.D. 1466-A.D. 1494, 1839.

Bell, Sam Hanna; Robb, N.A.; Hewitt, J. *The Arts in Ulster: a symposium.*

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Library of Congress *Classification:* Class J, *Political science*, 1910; Class Q, *Science*, 1905; Class Z, *Bibliography and library science*, 1910.

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Schultz, L. P. *Fishes of the Marshall and Marianas Islands.* (Smithsonian Institute, *U.S. National Museum bulletin* 202, 1953.)

State papers of Sir Ralph Sadler, 3 vol. (quarto), 1809.

Surrey County Council. Surrey Quarter Sessions Records. *Order Book and Sessions Rolls*, 1659-61; 1661-63 (1934-5).

UNITED STATES OF AMERICA

(307) WOMEN'S INTERNATIONAL LEAGUE FOR PEACE AND FREEDOM, U.S. Section, 2006 Walnut Street, Philadelphia 3, Penna.,

Offers: *Cathedral of compassion*, 1955. Contains an outline of the life of Jane Addams, one of the founders, in commemoration of the League's fortieth anniversary.